

CLAIMS:

- 1) A sensing device for sensing a product item provided in a sensing region, wherein the product item includes an interface surface having disposed thereon at least one of:
  - (a) coded data which includes, at a plurality of locations on the interface surface, a corresponding plurality of coded data portions, each coded data portion being indicative of an identity of the product item; and,
  - (b) a barcode which encodes an identifier;
 the sensing device including:
  - (i) a coded data sensor for sensing at least one coded data portion;
  - (ii) a barcode sensor for sensing the barcode;
  - (iii) a processor for generating identity data indicative of the identity of the product item using at least one of:
    - (1) the at least one sensed coded data portion; and,
    - (2) the barcode;
  - (c) a communicator for transferring the indicating data to a computer system.
- 2) The sensing device of claim 1, wherein the coded data sensor and barcode sensor utilise a 2D image sensor, for sensing at least one of:
  - (i) an entire coded data portion; and,
  - (ii) the entire barcode.
- 3) The sensing device of claim 1, wherein the coded data sensor and barcode sensor utilise a sensor adapted to sense a spot of radiation, and wherein in use, the sensing device is moved relative to the product item to thereby sense the barcode.
- 4) The sensing device of claim 1, wherein the sensing device includes a radiation source for exposing at least one of the coded data and the barcode to radiation.
- 5) The sensing device of claim 4, wherein the sensing device includes a respective radiation source for exposing each of the coded data and the barcode.
- 6) The sensing device of claim 1, wherein the sensing device includes a laser for emitting at least one scanning beam, the scanning beam being directed in first and second orthogonal directions to thereby generate a raster scan pattern over a scanning patch, the scanning patch being provided in the sensing region such that it exposes at least one of a coded data portion and the barcode.
- 7) The sensing device of claim 6, wherein the sensing device includes at least one beam controller for directing the at least one scanning beam along selected ones of a number of patch beam paths, each patch beam path extending into the sensing region at a respective angle.
- 8) The sensing device of claim 6, wherein the scanning device includes an amplitude modulator for modulating the amplitude of the scanning beam.

- 9) The sensing device of claim 8, wherein the scanning device:
  - (a) determines from radiation sensed by the coded data sensor, using the modulation of the scanning beam, ambient light incident on the coded data sensor;
  - (b) determines from radiation sensed by the coded data sensor, using the determined ambient light incident on the coded data sensor, the radiation reflected from the interface surface; and,
  - (c) senses the coded data from the radiation reflected from the interface surface.
- 10) The sensing device of claim 6, wherein the scanning device includes a focussing element.
- 11) The sensing device of claim 1, wherein the scanning device includes a filter for filtering radiation incident on at least one of the coded data sensor and the barcode sensor, the filter being at least one of:
  - (a) a near infrared filter;
  - (b) a bandpass filter; and,
  - (c) a longpass filter.
- 12) The sensing device of claim 1, wherein the coded data portions are provided at respective positions on the interface surface, wherein each coded data portion is indicative of the identity of the product item, and wherein the sensing device:
  - (a) senses at least one coded data portion; and,
  - (b) generates the indicating data using the sensed coded data portion, the indicating data being indicative of at least one of:
    - (i) a position of the sensed coded data;
    - (ii) a position of the sensing device relative to the interface surface;
    - (iii) an orientation of the sensed coded data;
    - (iv) an orientation of the sensing device relative to the interface surface; and,
    - (v) movement of the sensing device relative to the coded data portions.
- 13) The sensing device of claim 1, wherein the interface surface includes at least one region, including coded data indicative of an identity of the at least one region, and wherein the sensing device:
  - (a) senses the coded data disposed within the at least one region; and,
  - (b) generates, using the sensed coded data, indicating data indicative of the region identity.
- 14) The sensing device of claim 1, wherein the product item includes an RFID tag which encodes an identifier and wherein the sensing device includes an RFID tag reader for reading RFID tags, and wherein the processor is further adapted to determine indicating data using the identifier sensed by the RFID tag reader.
- 15) A sensing device adapted to scan a product item provided in a sensing region, wherein the product item includes an interface surface having disposed thereon at least one of:

- (a) coded data which includes, at a plurality of locations on the interface surface, a corresponding plurality of coded data portions, each coded data portion being indicative of an identity of the product item, the product item being provided in a sensing region; and,
- (b) an RFID tag which encodes an identifier; and,

5       the sensing device including:

- (i) a coded data sensor for sensing at least one coded data portion;
- (ii) a RFID tag reader for reading RFID tags;
- (iii) a processor for determining indicating data using at least one of:

10       (1) the identity of the product item determined from at least one sensed coded data portion; and,

      (2) the identifier determined using the RFID tag reader;

      (c) a communicator for transferring the indicating data to a computer system.

16) The sensing device of claim 15, wherein the coded data sensor is formed from at least one of:

- (a) a 2D image sensor, for sensing at least one coded data portion; and,
- 15       (b) a sensor adapted to sense a spot of radiation.

17) The sensing device of claim 15, wherein the sensing device includes a radiation source for exposing at least one coded data portion.

18) The sensing device of claim 15, wherein the sensing device includes a laser for emitting at least one scanning beam, the scanning beam being directed in first and second orthogonal directions to thereby generate a raster scan pattern over a scanning patch, the scanning patch being provided in the sensing region such that it exposes at least one coded data portion.

19) The sensing device of claim 18, wherein the sensing device includes at least one beam controller for directing the at least one scanning beam along selected ones of a number of patch beam paths, each patch beam path extending into the sensing region at a respective angle.

20) The sensing device of claim 19, wherein the scanning device includes an amplitude modulator for modulating the amplitude of the scanning beam.

21) The sensing device of claim 20, wherein the scanning device:

- (a) determines from radiation sensed by the coded data sensor, using the modulation of the scanning beam, ambient light incident on the coded data sensor;
- 30       (b) determines from radiation sensed by the coded data sensor, using the determined ambient light incident on the coded data sensor, the radiation reflected from the interface surface; and,
- (c) senses the coded data from the radiation reflected from the interface surface.

22) The sensing device of claim 20, wherein the scanning device includes a focussing element.

35   23) The sensing device of claim 15, wherein the scanning device includes a filter for filtering radiation incident on the coded data sensor, the filter being at least one of:

- (a) a near infrared filter;
- (b) a bandpass filter; and,
- (c) a longpass filter.

5 24) The sensing device of claim 15, wherein the coded data portions are provided at respective positions on the interface surface, wherein each coded data portion is indicative of the identity of the product item, and wherein the sensing device:

- (a) senses at least one coded data portion; and,
- (b) generates the indicating data using the sensed coded data portion, the indicating data being indicative of at least one of:
  - 10 (i) a position of the sensed coded data;
  - (ii) a position of the sensing device relative to the interface surface;
  - (iii) an orientation of the sensed coded data;
  - (iv) an orientation of the sensing device relative to the interface surface; and,
  - (v) movement of the sensing device relative to the coded data portions.

15 25) The sensing device of claim 15, wherein the interface surface includes at least one region, including coded data indicative of an identity of the at least one region, and wherein the sensing device:

- (a) senses the coded data disposed within the at least one region; and,
- (b) generates, using the sensed coded data, indicating data indicative of the region identity.

20 26) The sensing device of claim 15, wherein the sensing device further includes a barcode sensor for sensing an identifier encoded with a barcode on the data surface and wherein the processor generates indicating data indicative of the identity of the product item using the barcode.

27) The sensing device of claim 1 and claim 26, wherein the barcode is a 2D barcode.

25 28) The sensing device of claim 1 and claim 26, wherein the barcode is provided on the interface surface using visible markings.

29) The sensing device of any one of claims 1 and 15, wherein the coded data is indicative of an EPC associated with the product item.

30) The sensing device of any one of claims 1 and 15, wherein the coded data distinguishes the product item from every other product item.

30 31) The sensing device of any one of claims 1 and 15, wherein the coded data is redundantly encoded.

32) The sensing device of any one of claims 1 and 15, wherein the coded data is redundantly encoded using Reed-Solomon encoding.

35 33) The sensing device of any one of claims 1 and 15, wherein the processor is adapted to use the redundantly encoded coded data to detect one or more errors in the coded data

- 34) The sensing device of any one of claims 1 and 15, wherein, in response to the detection of one or more errors, the scanning device performs at least one of:
- (a) correcting the one or more detected errors;
  - (b) signaling a failed scan; and,
  - 5 (c) ignoring the coded data.
- 35) The sensing device of any one of claims 1 and 15, wherein the coded data is substantially invisible to the unaided eye.
- 36) The sensing device of any one of claims 1 and 15, wherein the coded data is printed using infrared ink.
- 10 37) The sensing device of any one of claims 1 and 15, wherein the coded data is provided on the interface surface coincident with visible markings representing at least one of:
- (a) product item information;
  - (b) the identity of the product item; and,
  - (c) product item status information.
- 15 38) The sensing device of any one of claims 1 and 15, wherein the interface surface is at least a portion of at least one of:
- (a) product item packaging;
  - (b) product item labelling; and,
  - (c) a surface of the product item.
- 20 39) The sensing device of any one of claims 1 and 15, wherein the coded data is disposed over at least one of:
- (a) substantially all of any one of:
    - (i) an entire product item surface;
    - (ii) packaging; and,
    - 25 (iii) a product item label;
  - (b) more than 25% of any one of:
    - (i) an entire product item surface;
    - (ii) packaging; and,
    - (iii) a product item label;
  - 30 (c) more than 50% of any one of:
    - (i) an entire product item surface;
    - (ii) packaging; and,
    - (iii) a product item label;

(d) more than 75% of any one of:

- (i) an entire product item surface;
- (ii) packaging; and,
- (iii) a product item label.

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